# How Can ASHRAE Help To Rebuild Hawaii

by
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Past Regional Director (1994-97)

## So….. what are we gonna discuss?

- Who needs to know about ASHRAE?
- What is ASHRAE and what role does it play worldwide?
- How does HVAC&R technology impact your life?
- What does comfort mean to us as ‘energy consumers’?
- Who cares about energy measures? Why conserve energy?
- Can we share some strategies for success with each other?

Who wants to be a $$$ Billionaire $$$ ?
Where do we start to become a Millionaire?
Probably, one needs to have the “COMFORT” in life!

## Advanced Environmental Systems

- An architect once said: “It isn’t so much what you build, but, how well you build it.”
- Let’s add to that: “It isn’t so much how well you build. The building is only livable if the heating, ventilating & air-conditioning system is well designed and effectively working.”

## How do we bridge ourselves to 2020?

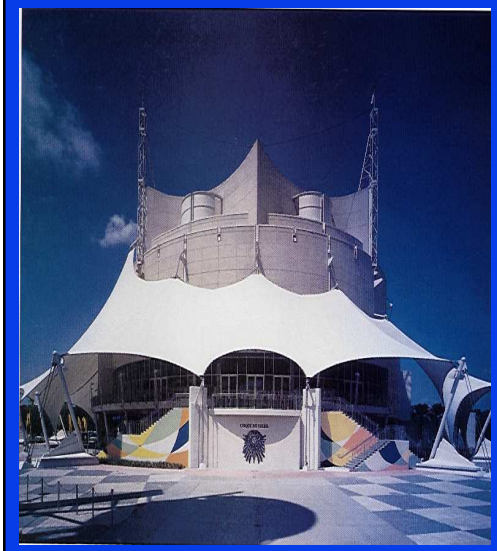
- Design ‘Smart Rooms or Smart Buildings’ equipped with cameras, microphones, sensors that see what we’re doing & anticipate our needs.
- Improvise ‘handSCAPE’, a tape measure that stores digital measurements & feeds them to a host computer, allowing 3-dimensional portrayals of the object.
- Manufacture sport jacket (pants, shirt or necktie) of conductive fabric that sends email & searches the internet. Store data in the heel of your loafers.
- Provide ‘Technology for Better Environment’

## Architectural Record …. December 1999

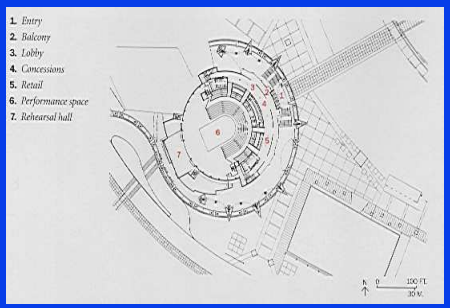
Architects are ….

- Recognizing buildings be environmentally sound as well as aesthetically appealing
- Responding by specifying energy-efficient products and systems
- Being cognizant of indoor air quality issues
- Using sustainable design techniques

## Cirque du Soleil, Orlando Florida



**Mystery of Performances: Innovative architectural structure poses a circus of challenges to MEP engineers**



## Heating Ventilation Air-conditioning and Refrigeration (HVAC&R)

- More of an 'Art' than a 'Science'
- Down-to-earth technology
- Pragmatic and simplistic
- Important role in construction industries
- Human comfort @ home, work and play

## A S H R A E

**Mission** : To Advance the Arts and Sciences of Heating, Ventilation, Air Conditioning, Refrigeration and All Related Human Factors to Serve the Evolving Needs of the Public.

# History of ASHRAE

1894: ASHVE (American Society of Heating Ventilating Engineers)

1904: ASRE (American Society of Refrigerating Engineers)

1954: ASHAE (American Society of Heating Air-conditioning Engineers)

1959: ASHAE + ASRE = ASHRAE (American Society of Heating, Refrigerating & Air-conditioning Engineers)

2007: International Organization (54,000 members worldwide - 14 Regions, 160 Chapters & 250 Student Branches) - UHM Student Branch, Hawaii Chapter, Region X

# Who Are ASHRAE Members?

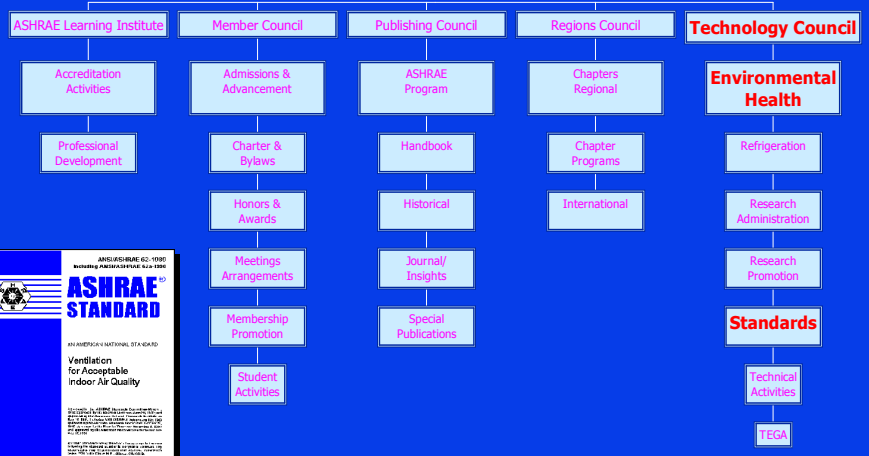
## 54,000 Members in 120 Countries

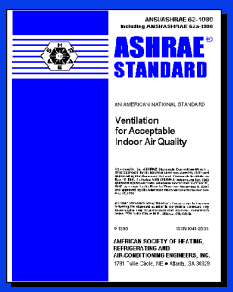
- Consulting Architects
- Consulting Engineers
- Contractors
- Educators
- Students
- Building Operators
- Service Technicians
- Building Code Officials
- Government Employees
- Researchers
- Design Engineers
- Bldg Owners/Managers

# ASHRAE Organization Chart

## Volunteer Structure


# Organization of Committees



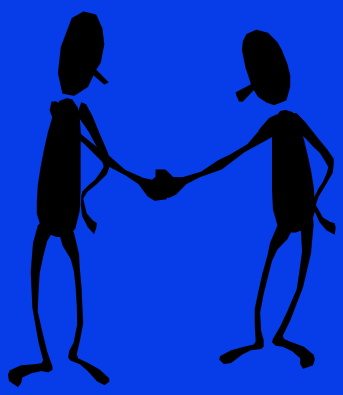




**Standards 15, 34, 55, 62, 90.1**

## Global Environmental Issues

- Indoor Air Quality
- Energy Conservation
- Global Warming
- Ozone Depletion

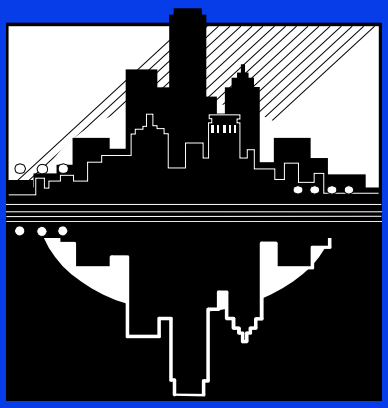
## What Is ASHRAE Doing To Help You?



- Increase Employee Productivity
- Save Energy Costs
- Protect the Outdoor Environment

## Primary Functions of HVAC&R Systems

- **SHELTER (Construction)** - Generate and maintain comfort for occupants
- **CLOTHING & FOOD** - Improve or control an industrial process or product



## HVAC&R Technology Impacts Your Life

### Positive Impacts on Our World

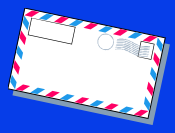
- Modern Cities
- Food Preservation, Storage, Shipping
- Microprocessor Chips
- Sophisticated Healthcare, Medicines
- Space Exploration

# If Not For HVAC&R Technology

No Modern Cities in Sunbelt

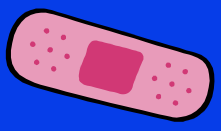
Limited Food Preservation

No Computers, Copiers



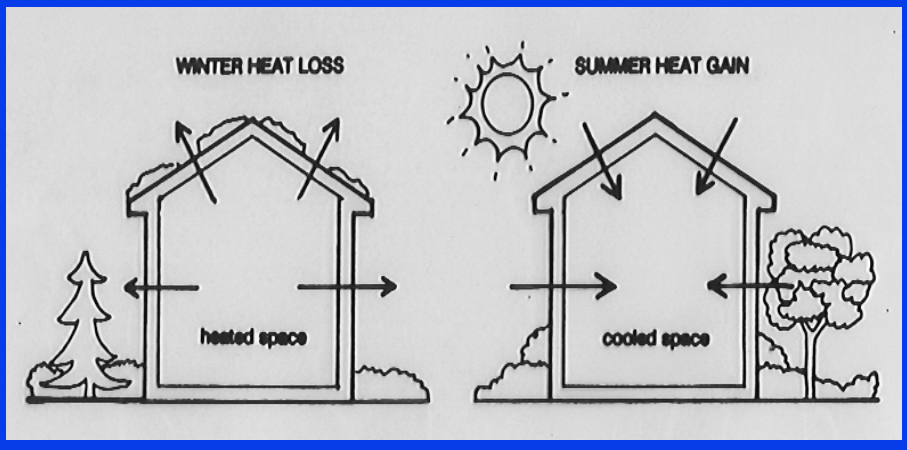
No Faxes, E-Mail

No Air Travel



No Antibiotics

# Comfort Zone for Occupants???




ENERGY CONSERVATION WITHOUT SACRIFICING COMFORT

*"Everyone complains about the weather, but , no one has done anything about it."*

*Mark Twain*

*"Man masters nature not by force, but ..... by understanding."*

*Jacob Bronowski*

# What affects our COMFORT?

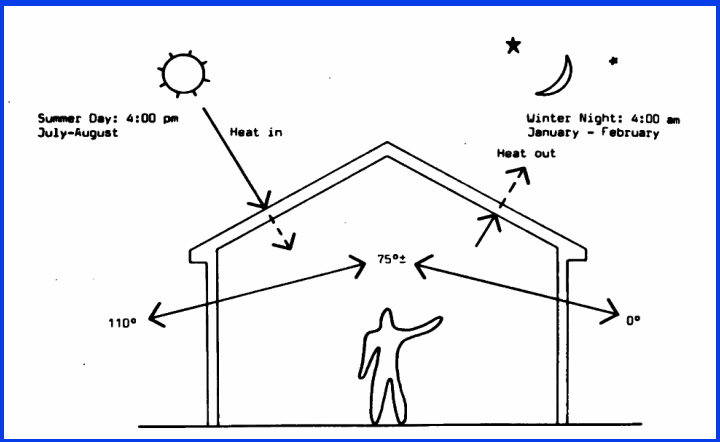
- Temperature (68 °F to 78 °F)

  Summer : 78 °F (min cooling)

  Winter : 72 °F (max heating)

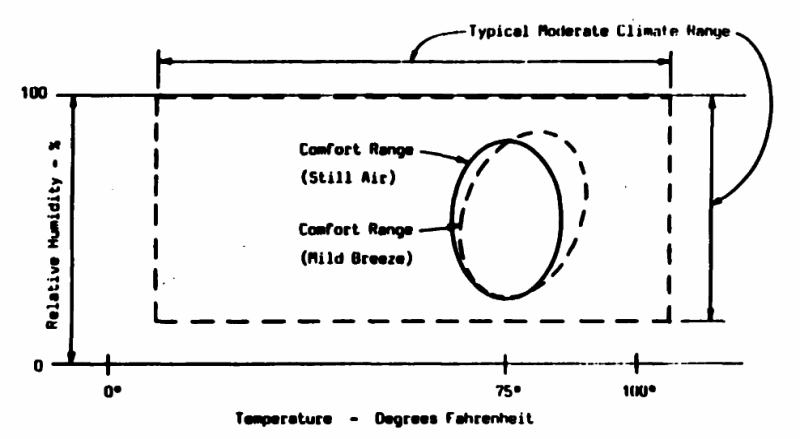
- Relative Humidity (30% to 60%)
- Air Motion

# Design Extremes?




Extremities: Summer Afternoon and Winter Night

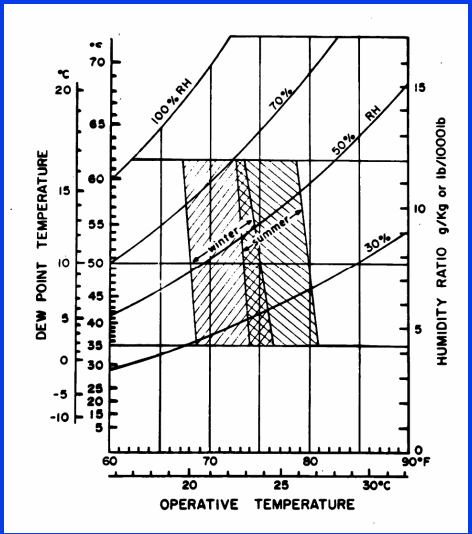
# Still Air versus Mild Breeze



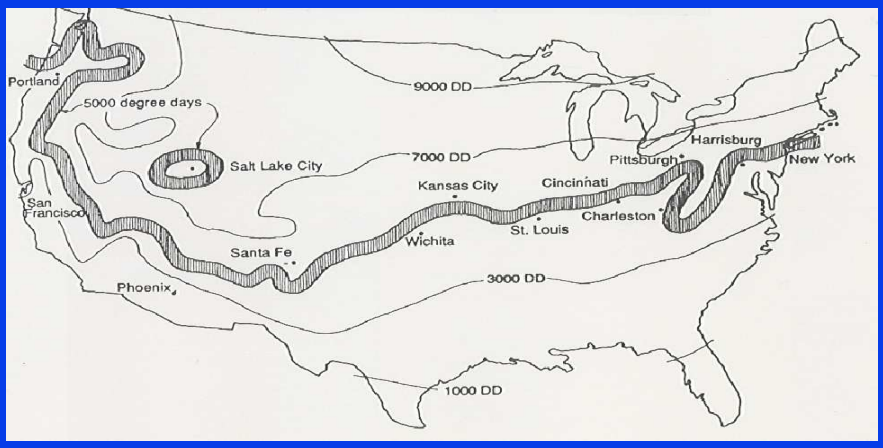

Comparison of climate range & average comfort range with and without air movement

# ASHRAE Standard 55

**Acceptable ranges of operative temperature and humidity for persons clothed in typical summer & winter clothing, at light mainly sedentary activity.**



# Degree Days (DD)




- **DD = (65 ºF - Average Outdoor Air Temperature) * 24 hours**
- **Estimating Fuel Consumption**
- **Specifying Nominal Heating Load**

# DECISION MADE BY ENERGY CONSUMERS

- **CONSERVE**

  **Enhance your financial status**

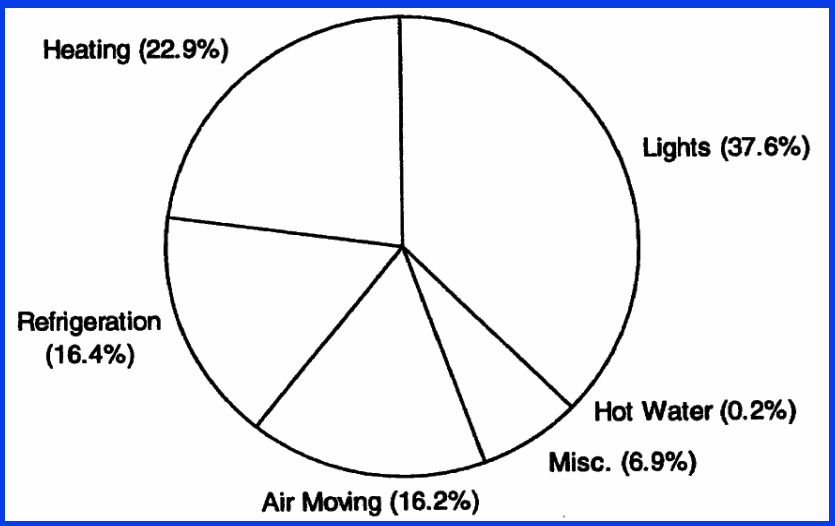
  **Mothball the construction of more power plants**

- **DEPLETE**

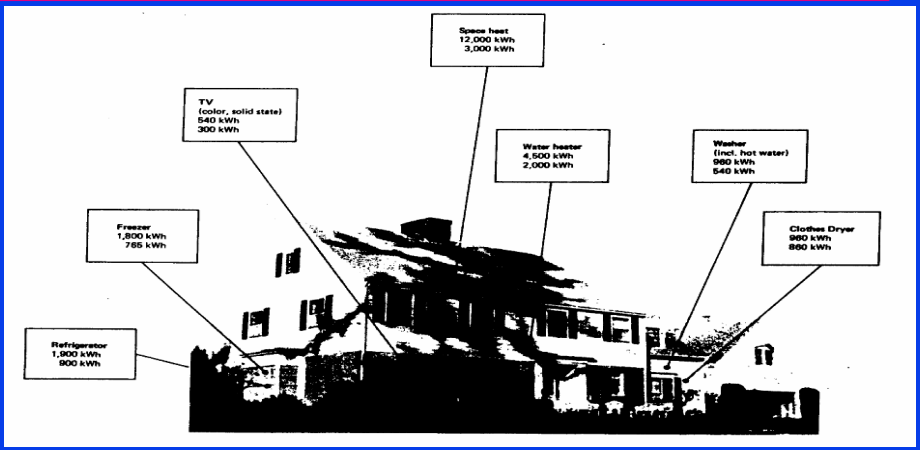
  **Reduce your expendable income**

  **Compel utilities company to generate more power and to pump more gas**

# Energy Use in Commercial Building




# Energy Conservation Measures (ECM)




- **Upper/Lower Figures: Before & After Initiation of ECM**
- **Annual Energy Consumption: 27,000 KWH or 90 MBH (90,000 BTUH)**

## Strategies for Success - COMFORT

Long Range Planning

Short Range Planning

Planning for the Entire Year

} Be specific & outline details

## LONG RANGE PLANNING

- Walls : R-19 Insulation
- Roof : R-30 Insulation
- Windows : Double Glazing
- Appliances: Energy Efficient

## SHORT RANGE PLANNING

(Low Cost/No Cost Measures)

- Heating Season

  Occupied : Set thermostat @ 68 $^{o}$F

  Unoccupied : 50 $^{o}$F < t'stat < 60 $^{o}$F

- Cooling Season

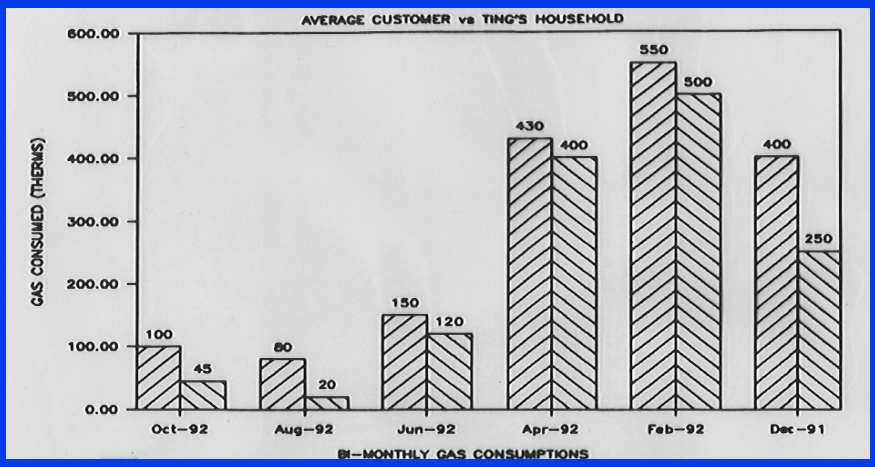
  Occupied : Set thermostat @ 78 $^{o}$F

  Unoccupied : System OFF; Don't open windows

## PLANNING for the ENTIRE YEAR

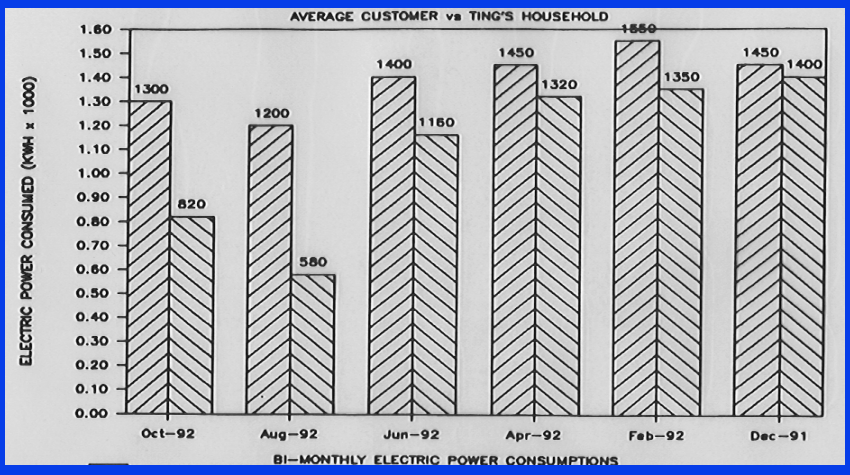
- HVAC Unit : Select efficient, easily maintained unit
- Control System : Know how it works to operate properly
- Air Filters : Change regularly
- Toilet & Kitchen Exhaust Fans : Turn OFF ….if not needed
- Close draperies and/or adjust shades to block out the sun
- Domestic Hot Water Heater : Maintain tank temp at 105 $^{o}$F
- Lighting in unoccupied space : Turn OFF ….if not needed
- Hallways/Stairways/Corridors Lighting : Use 25 watt lamp (30 foot-candle should be sufficient)

# Comparison of Gas Consumption



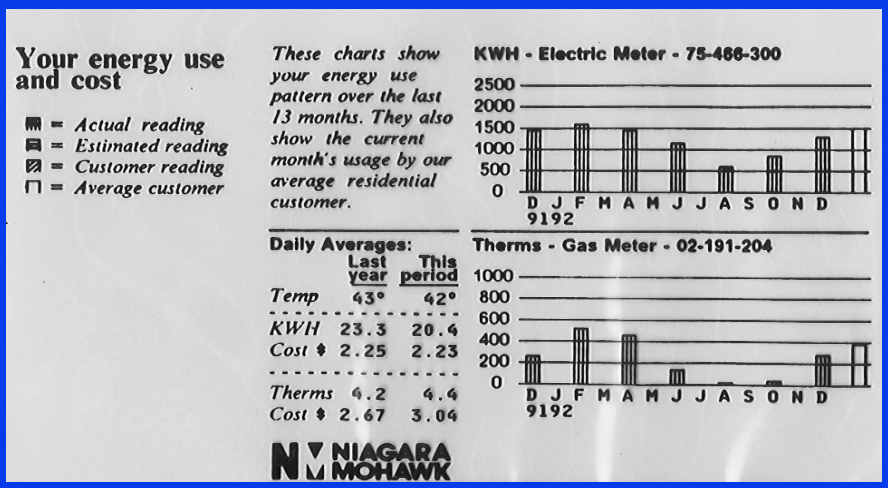

Average Customer  Ting's Household

# Comparison of Electric Consumption




Average Customer  Ting's Household

# Annual Energy Consumption




# What Have We Discussed?

- Knowledge of HVAC&R - A Treasure for All of Us
- ASHRAE - Its History, Organization & Volunteers
- HVAC&R Technology Better Our Environment
- Choice of Energy Conservation or Energy Depletion
- Comfort - Ongoing Concerns for Energy Consumers
- Strategies for Success - COMFORT

Financial Stability …$ Billionaire ... $ Millionaire

*"Man Has a Set of Gifts Which Make Him Unique Among the Animals,*

*So that Unlike Them He is Not a Figure of the Landscape.*

*He is the Shaper of the Landscape."*

*Jacob Bronowski*